Math 501 - Real Analysis

(Analysis A)


Course Objectives. The course covers Lebesgue integration theory. This is a centerpiece of modern analysis, providing a key tool in many areas of pure and applied mathematics.

Course Topics


2. Construction of a measure on a $\sigma$-algebra of subsets. Outer measure. Measurable sets and sets of measure zero.

3. The Lebesgue measure on $\mathbb{R}^n$. Borel sets and sets of measure zero. The $\sigma$-algebra of Lebesgue measurable sets. Approximation by open and closed sets. Measurable functions. Egoroff’s theorem, Lusin’s theorem.


7. The Fourier transform on $L^2(\mathbb{R}^n)$. Definition and basic properties. Inversion formula and Plancherel’s theorem. Applications to PDE’s with constant coefficients.

8. Additional topics, time permitting: Hausdorff dimension, Cantor sets, Fractal sets.

References

